PB-215 048

WHAT HAS BEEN DONE, IS NOW BEING DONE, WILL BE DONE TO ELIMINATE AIR POLLUTION. THE ROLE OF THE FEDERAL GOVERNMENT

Leslie A. Chambers

Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio

1955

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

LIBRARY
SANITARY ENGINEERING CENTER
CINCINNATI, OHIO

PB 215 048

WHAT HAS BEEN DONE, IS NOW BEING DONE, WILL BE DONE TO ELIMINATE AIR POLLUTION! THE ROLE OF THE FEDERAL GOVERNMENT

by

Leslie A. Chambers, Ph.D.
Director of Research
Robert A. Taft Sanitary Engineering Center
U. S. Public Health Service
Cincinnati, Ohio

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

Presented at
Southern California Conference on
Elimination of Air Pollution
California State Chamber of Commerce
Los Angeles, California
November 10, 1955

WHAT HAS BEEN DONE, IS NOW BEING DONE, WILL BE DONE TO ELIMINATE AIR POLLUTION! THE ROLE OF THE FEDERAL GOVERNMENT

It is a paradox in the nature of man that he interests himself overwhelmingly in that which is beyond his reach or comprehension, and is content in his ignorance of the familiar and approachable. He invests huge effort in expeditions to the depths of the sea or the heights of the Himalayas; he sounds space with telescopes which take years to build and assesses the physical properties of the planets; he splits atoms into sub-atomic particles, with monumental engines, and manufactures elements with no counterparts in the known universe; he gropes intuitively and continuously for the transcendental, esoteric and mystical in a metaphysical universe which, by definition, he can never comprehend.

But the everyday, commonplace indispensable objects which intrude into his consciousness continuously he accepts uninquisitively as though anaesthetized by familiarity. Himself, his wife, the water he drinks, seem seldom to become objects of concern until their properties become so distasteful to him that he dies of cardiac failure or suicide, obtains a divorce, or writes a vigorous letter to the editor or to his Congressman.

This being so, it is perhaps not too surprising that there has been relatively little interest in the gaseous medium within which we live and without which we cannot live. Wherever air has become contaminated to nuisance levels, public clamors against the obviously unsatisfactory state of affairs have given rise to investigation and efforts at abatement but, so far, these reactions have occurred in only a few major population centers of the United States. In even fewer has the reaction been vigorous enough

or sufficiently sustained, to produce systematic studies of the make-up of the community air supply or of the effects of abnormal compositions on the health, comfort or economy of the community.

Air, unoccupied by man, is a mixture of nitrogen, oxygen, carbon dioxide and a few rare gases, and is a medium to which the human physiology is well adapted. On the other hand, air occupied and used by man, like almost everything else he touches, becomes altered, tending toward a mixture less well suited to human activity. Fortunately, nature has provided a huge reservoir of this primeval mixture of gases and gravitational forces adequate to keep it within human reach. Fortunately, also, nature has provided sequences of temperature change on earth, ensuring constant mixing and therefore dilution of man's effluvia by air currents, winds and cyclones. And she occasionally provides liquid air scrubbers in the form of rains to cleanse the lower layers. Our miles deep blanket of friendly gases must be regarded along with the sea as a basic and almost inexhaustible natural resource.

But natural processes such as the dispersion of man's airborne by-products proceed within time limits. Wherever our activities produce noxious or troublesome substances at rates faster than those operating to disperse them, a build-up in concentration of the pollutants occurs and persists until natural forces, taking their fixed time, can cope with the situation. Naturally, an important element in the increasing frequency of such build-ups is the increase in numbers of people. Much has been spoken and written about population pressure in relation to food supplies and national economies. Many more words will undoubtedly be written in future decades about its effects on our immediate gaseous environment. More people will require more industry, more agriculture, more household heating, more transportation,

more power, more refuse disposal. And all of these will amplify, locally and generally, the undesirable characteristics of our air unless control methods can be found and applied.

Furthermore, the early development of our nation has already created a pattern of population distribution, and therefore, of industrial development, which tends to accentuate the air pollution problem. Early settlements were of necessity, established on river or coastal marine trade routes. Many of these sites were selected undoubtedly because there appeared a reasonably flat townsite by the river bank or the sea, sheltered to landward by highlands pierced by gently sloping passes to serve as trade routes to the interior. Los Angeles was one of these. So were Pittsburgh and Charleston, Portland and Cincinnati. It is a notable fact that these cities and others of similar topography have produced more public reaction to air pollution, at earlier stages in their industrial growth than any other class of communities.

The reasons are not difficult to understand and have been elaborated many times. The same temperature differences which, on a broader scale, cause the dispersing winds to blow, produce, at times, a very different effect. Our beautiful, and hill surrounded city becomes the bottom of a "lake" of static air into which flows the cool heavy air from the uplands or the sea and from which little flows out until more general weather phenomena intervene to reverse the process. Sometimes this inverted status persists with more or less intensity for several days. Now, when it is recalled that our activities are either in the trough of the valley or along those gently sloping access ways to the former fur trade, it is evident

that we and our progenitors have created a situation of potential difficulty. It is equally evident that under such conditions, air pollution controls applied in the trough of the valley only, cannot be fully effective in abating pollutional build-ups. Recognition of this fact has led to the authorization of Air Pollution Authorities or Commissions involving entire counties or groups of counties in the State of California. The need for such area-wide control authority is becoming apparent in many other metropolitan areas of our nation, even where topography is a lesser factor.

The cities located at the bottom of these periodic land-locked air lakes have not only engendered clamor; they have also been the first places in the United States to undertake more or less successful abatement programs, and include practically all the areas in which any serious studies of the nature of the community air pollutants have been undertaken.

Two recent aspects of the development of the air pollution problem have precipitated the organization of a national program of assistance to local, regional, and State control activities. On the one hand, it has become increasingly apparent that our air resource, though huge, has finite limits; that it has not an inexhaustible capacity for acceptance and dilution of the airborne waste products of human existence; that the national air resource, along with the national water resource is a concern of all the American people. On the other hand, many local governmental authorities have appealed to the Executive branch of the Federal Government and to the Congress for central action to alleviate the financial burden on individual communities in conduct of research to understand the problem, development of methods to be used in pollution abatement, and provision of specialized

technological services. Los Angeles and the State of California, probably provided the immediate impetus for legislation by the last session of Congress, authorizing a national air pollution program, and appropriating funds for activation of the general supportive action.

While the planned participation of the National Government in air pollution control can be said to date from the enactment of this very recent legislation, the Public Health Service and other federal agencies have frequently acted within their general authorizations and without specific appropriation, to render aid to local areas in extreme emergencies, and to provide some scientific and consultative assistance.

Numerous efforts at the Federal level can be recognized as contributing to the effectiveness of the struggle to limit "smog" incidents in California prior to 1955. The continuous measurement and analysis by the Weather Bureau of meteorological factors governing local weather patterns have provided bases for the more detailed estimates of air movement and inversion frequency in the Los Angeles basin, and constitute one of the resources available to the Control District for prediction of "smog" conditions. The Bureau of Mines studies on combustion products and their control, especially related to mineral fuels, have complemented numerous investigations of these factors in the local atmospheric complex. This agency of the Department of the Interior has also contributed valuable analyses of exhaust from internal combustion engines under various operating conditions.

The Bureau of Standards, with its outstanding scientific staff, has conducted explorations of accurate methods for analysis of air pollutants, and has applied some of these in direct studies of the Los Angeles atmosphere.

Each of these agencies, and others, have provided consultation and occasional technical advice in their respective areas of competence upon request from local investigators or authorities.

The Public Health Service direct action, prior to 1955, in relation to the Southern California problem was of three kinds. First, over a period of years, the research of certain skilled investigators in California academic institutions was partially supported by funds provided through the Division of Research Grants of the National Institutes of Health. Some of these studies are direct inquiries into the possible adverse physiological effects of substances known to contribute to Los Angeles smog.

Second, as part of an effort to obtain comparative data respecting the amounts, composition, and time variations in atmospheric particulate matter throughout the United States, the Robert A. Taft Sanitary Engineering Center has maintained periodic particulate sampling in both the Los Angeles and the San Francisco Bay areas for about two years. Analyses of the collected dusts indicate an unexpectedly close correlation between particulate loading of the air, and variations in oxidants and other constituents associated with smog. It also has demonstrated, that airborne particles occur in Los Angeles in concentrations fully as great as those which occur in any other city in the United States. The role of this dust cannot be ignored in any full consideration of the pollutional complex of the area. Detailed comparisons of chemical composition have indicated at least one unexplained phenomenon. The nitrate content of the particulate matter appears nearly tenfold greater in samples from the California coastal area than in those from any other part of the continent.

The third Public Health Service activity in assistance to the California "smog" abatement effort has been the provision of special consultants to the State Department of Health to assist in preparing a report to the Governor including recommendations for legislative action. Several specialists were detailed to the State for periods ranging from a few days up to six months. They contributed to the accumulation of facts, analyses of data, technical consultation, and drafting of copy which resulted in publication of the brochure "Clean Air for California."

Since enactment of the Air Pollution Control law in the closing days of the last session of Congress, the Department of Health, Education, and Welfare (of which the Public Health Service is a component) has been specifically authorized to conduct research, make research grants and contracts, provide assistance to States and local communities, and conduct training and demonstration activities respecting air pollution and its control. As required by the new program, use is to be made of the specialized resources of other Departments and agencies of the Federal Government.

The Air Pollution Control legislation (Public Law 159) authorizes appropriations up to $5,000,000 for each of the five fiscal years, 1956 through 1960. Pursuant to this authorization, a total of $1,784,000 was appropriated for expenditure during the year beginning July 1, 1955. Of this amount, $500,000 is allocated for research grants; and the balance has been earmarked for direct research, contract research, technical assistance and consultative support to States and local communities. Specific portions of the program have been accepted by other Federal agencies in accordance with their existing capabilities and resources. Included among these are the

Weather Bureau, the Bureau of Mines, and the Bureau of Standards. The Federal effort is coordinated through the Public Health Service.

The magnitudes of current fiscal resources available for specific purposes this year are indicated by the following breakdown of the regular, and supplemental budgets which together make up the total of $1,784,000.

REGULAR BUDGET (July 1955-June 1956)		
Division of Special Health Services (medical studies)		$160,000
Division of Sanitary Engineering Services (non-medical studies)		434,000
		594,000
SUPPLEMENTAL BUDGET (July 1955-June 1956)		
*Research Grants (medical and non-medical)		500,000
Research Contracts		250,000
Medical	$200,000	
Non-medical	50,000	
Training (at Robert A. Taft Sanitary Engrg. Center)		40,000
Reimbursement Funds		400,000
U.S. Weather Bureau	$200,000	
U.S. Bureau of Mines	100,000	
U.S. Bureau of Standards	100,000	
		$1,190,000
Grand Total		$1,784,000

* Administered by the National Institutes of Health.

In its five months of existence, the Air Pollution program of the Federal Government has made long strides toward staff recruitment, organization, and projected program development. Laboratories have been equipped, some applications for research grants totalling about $300,000 are being supported, and considerable direct assistance to local surveys and pollution abatement programs has been made.

The specific investigative activities being supported by research grants reflect the areas of current interest to researchers and constitute an

extension of the government's impact on the problem. Research supported by grant is in progress in the following areas:

INVESTIGATOR - INSTITUTION	AMOUNT	DESCRIPTION OF PROJECT
John J. Phair University of Cincinnati Cincinnati, Ohio	$69,209	The design and organization of a study to relate the incidence, prevalence, and prognosis of human disease to air pollution in an urban area.
Joseph C. Molner Detroit Department of Health Detroit, Michigan	$20,000	A comprehensive study of the effects of air pollution on health.
Paul Kotin University of Southern California Los Angeles, California	$10,982	Determination of acute and subacute biologic effects of air pollutants.
Delbert A. Greenwood Richard H. Call Utah State Agricultural College Logan, Utah	$43,107	The effect of atmospheric fluorides on man.
Maurice L. Thomson Irene Campbell University of Cincinnati Cincinnati, Ohio	$11,730	Classified bibliography of atmospheric pollution with particular reference to its effects on man.
Heinrich Brieger Jefferson Medical College Philadelphia, Pennsylvania	$11,126	Absorption routes of inhaled air contaminants: Intestinal vs. pulmonary deposition.
Mary C. Amdur Harvard School of Public Health Boston, Massachusetts	$14,634	The physiologic response of animals and human subjects to atmospheric pollutants.
Hurley L. Motley University of Southern California Los Angeles, California	$36,784	Investigation of the effect of breathing smog air on pulmonary function in man.
E. Wendell Hewson John M. Sheldon University of Michigan Ann Arbor, Michigan	$63,420	Atmospheric pollution by aeroallergens.
Bernard D. Tebbens University of California Berkeley, California	$14,375	Particulate air pollutants resulting from combustion.

The intra-mural research program of the Public Health Service at present is primarily concerned with environmental aspects of air pollution. At the Robert A. Taft Sanitary Engineering Center in Cincinnati efforts are being concentrated on development of sampling and analytical methods applicable to a variety of substances and circumstances, studies of reactions among substances in the atmosphere and the products of such reactions, assessment of emission control principles, and the comparative analysis of community air supplies throughout the United States.

The Center has also begun to evolve a program of assistance to local agencies active in coping with their own problems. This aid is currently in the form of assigned technicians, engineers, or skilled persons not otherwise available to the community, and of sampling equipment and analytical laboratory support. Meteorological skill is also available through assignment of Weather Bureau personnel to the Center.

The funds identified for training in the field of air pollution are being used to support three formal courses at the Robert A. Taft Sanitary Engineering Center this year, as well as two symposia on technical and administrative aspects of control programs.

The research program on medically related aspects of the air pollution problem is expected to be developed by the Division of Special Health Services of the Public Health Service, primarily on the basis of contracts with medical institutions and public health agencies.

The relationship of the total program to the California problem is readily discernible. Much of the research under way in the Cincinnati laboratories of the Public Health Service has as its raison d'être the

experiences of Los Angeles and can be expected to contribute substantially to eventual control activities in this area. The development of methods for analyses of gaseous air constituents by the Bureau of Standards, and the studies of automotive and other exhausts by the Bureau of Mines have similar incentives.

But, quite apart from research on problems common to Southern California and numerous other parts of the United States, a substantial portion of the current federal air pollution effort is being expended directly in support of the California smog abatement program. Present commitments include the detail of two engineers, a physical chemist, and three meteorologists to work with California agencies. Three of these are for assignment to the Los Angeles District; the others to the State Department of Health.

Of the research grants being supported, about 20% of the dollar total has been in aid of investigations in California universities on subjects directly related to Los Angeles smog. Three such grants are currently active, two in support of investigations of the physiological effects of "smog" and its components.

The operation of that portion of the National Air Sampling network covering the Los Angeles and San Francisco areas has been extended with a parallel increase in analytical back-up at the Robert A. Taft Sanitary Engineering Center. In addition, engineering, meteorological, medical, and epidemiological consultation is being furnished to California from time to time.

The total of expenditures directly committed to the State in the current year is about $120,000. The approval of additional research grants, and the consummation of research contracts could raise this figure appreciably.

The keynote of federal action in support of air pollution control efforts is its newness as an organized program. Its impact on the Los Angeles problem has been small. One suspects, in fact, that the existence of a federal program, and its early form, are strongly influenced by guidelines and observations made in California. For that reason it can be expected that the total product of the program will, for a long time, be strongly slanted toward solution of your vexing problem.

Indeed, any realistic appraisal of the situation must include recognition of the fact that what California agencies, and scientists have already accomplished is so substantial as to place them in positions of preeminence among their kind. Understanding of the reactions underlying "smog" formation, and the kinds of effluents which contribute to it; development of methods of measurement and prediction; and determination of actions which would check the nuisance if generally adopted, have proceeded farther in this area than elsewhere in the United States.

The magnitude of the federal rôle in air pollution control in the future will, of course, be determined by congressional appropriation; the quality of the federal program and its impact on the problem will remain for future assessment. Whatever the size, its effectiveness will be influenced in no small way by the extent to which it assimilates the accumulated experience and scientific progress already made. The rôle of California in shaping the national air pollution effort would, perhaps, have been a more realistic concept than the one to which these remarks have been addressed.